

REMARKS

I. Introduction

Claims 8-15 are currently pending, claims 1-7 were previously cancelled without prejudice. Claims 8, 13, 14 and 15 have been amended to further define the subject matter of the application, support for which is found throughout the specification, for example, in paragraph [0036] of the specification. No new matter has been added.

II. Claim rejections under 35 U.S.C. § 103(a)

Mohanty or Ohme, in combination with either Fumitomo or Gilman and Lee as evidenced by Ottenstein

Claims 8-10 and 13-15 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over either Mohanty (U.S. 2003/0216496) or Ohme (U.S. 2004/024803), in combination with either Fumitomo (JP2002-241566) or Gilman (Fire retardant additives for polymeric materials 1. Char formation from silica gel-potassium carbonate. Thirteenth meeting of the UJNR panel of fire research and safety, March 13-20, 1996, vol. 2) and further in view of Lee et al., (U.S. 6,337,363) as allegedly evidenced by Ottenstein (US 5,637,135).

Applicants respectfully disagree. However, in an effort to expedite prosecution, claims 8, 13, 14 and 15 have been amended to further define the subject matter of the application. As amended, independent claims 8, 13, 14 and 15 each now recite, in pertinent part,

“wherein said inorganic porous material on which flame retardancy-imparting component is supported is solid and particulate before it is dispersed in said resin composition, and

said inorganic porous material on which said flame retardancy-imparting component is supported has a diameter of from 25 nm to 150 nm in the resin composition.”

[Emphasis supplied].

As explained in paragraph [0036] of the instant specification, this configuration in which the inorganic porous material on which the flame retardancy-imparting component is supported has a diameter of from 25 nm to 250 nm in the resin composition achieves improved flame retardancy. The inorganic porous particles having such diameters are very fine and the resin composition according to claims 8, 13, 14 and 15 are characterized in that such fine particles are evenly dispersed in the resin composition whereby excellent flame retardancy is achieved.

Moreover, the resin composition in which such fine particles are dispersed can be obtained by crushing the inorganic porous material with the flame retardancy-imparting component supported thereon, which has a larger diameter (for example, 100 nm to 1000 nm), during kneading the resin composition as described in paragraph [0034] of the specification.

As such, in the resin composition according to claims 8, 13, 14 and 15 no aggregation of the particles of the inorganic porous material occurs to give giant particles.

In contrast to the above recited configuration, at a minimum, none of the cited prior art references teach or suggest a composition in which an **inorganic porous material on which a flame retardancy-imparting component is supported has a diameter of from 25 nm to 150 nm in the resin composition**, as recited in claims 8, 13, 14 and 15.

On page 3 of the office action mailed October 9, 2009, the Examiner concedes that neither Mohanty nor Ohme disclose a flame-retardancy component supported on an inorganic substrate. Therefore, the Examiner relies on Gilman or Fumitomo for allegedly disclosing fire retardant components on a porous silica gel, (see pages 4 and 5 of the office action mailed October 9, 2009). In particular, the Examiner asserts that Gilman teaches potassium carbonate on a porous silica gel support and that "the additives were mixed with the polymers by grinding the powders together in a mortar pestle" (page 262).

However, according to the portion of Gilman titled EXPERIMENTAL on page 261, the silica gel and K_2CO_3 are prepared *separately* and mixed together and then ground. In other words, Gilman does not teach or suggest that the K_2CO_3 , which is supported on silica gel, is crushed by grinding into fine particles with a nano-scale diameter.

Furthermore, Fumitomo does not disclose or suggest a resin composition in which the inorganic porous material having a diameter of 25 nm to 150 nm are dispersed, as recited in claims 8, 13, 14 and 15.

In addition, both Gilman and Fumitomo fail to teach or suggest the construction or structure in which the flame retardancy-imparting component is **supported** on the inorganic porous material, which is a characteristic of the present subject matter.

Moreover, Applicants provided clear evidence of the unexpectedly improved results achieved with this composition having a configuration in which the flame retardancy-imparting component is **supported** on the inorganic porous material in the inventor declaration under 37 C.F.R. § 1.132 filed on August 22, 2008.

Furthermore, on pages 5-6 of the office action mailed October 9, 2009, the Examiner concedes that neither Mohanty nor Ohme disclose an organic flame retardant supported before mixing with a polymer. Therefore, Lee is relied on for allegedly disclosing a hybrid flame retardant added to a polymer and Ottenstein is relied on for allegedly teaching that the flame-retardancy material used in Lee can be hydrolyzed to a **solid** silica gel.

However, neither Lee nor Ottenstein cure the deficiencies of Mohanty, Ohme, Gilman and Fumitomo. Lee discloses that a mixture of TEOS, PDMS, hydrochloric acid and isopropanol was stirred followed by addition of a phenolic novolac resin and propanol and subsequently heating the resulting mixture to obtain the desired silica-novolac hybrid resin

solution (preparation Example). Applicants note that Lee discloses the silica-novolac hybrid resin solution, which is not particulate. Therefore, Lee clearly does not teach or suggest that the hybrid flame retardant, where novolac is placed in silica support has a diameter of from 25 nm to 150 nm.

Moreover, the Examiner's reliance on Ottenstein as evidence to explain that when TEOS combines with PDMS and HCl, it hydrolyses to solid silica gel does not ameliorate the deficiencies of aforementioned prior art references.

Applicants respectfully submit that both Lee and Ottenstein cannot be prior art references for the present subject matter because Lee and Ottenstein are related to **organic-inorganic sol-gels** (see the col. 4, lines 46-47 of Ottenstein) not **solids**. In other words, the silica gel produced using TEOS (tetraethoxysilane) and PDMS (polydimethylsiloxane) is the organic-inorganic material wherein a methyl group (an organic component) is combined with -Si-O-Si-. Further, there is no teaching or suggestion in Ottenstein, that the resultant sol gel is **solid**. Indeed, "Column 13, line 10," the portion of Ottenstein cited by the Examiner for allegedly teaching that when TEOS is combined with PDMS and HCl it hydrolyses to solid silica-gel simply does not teach or suggest this. Rather, Ottenstein col. 13, line 10 describes the formation of a self-hydrolyzed and partially condensed oligomer to which DMEDES is added and heated to form a sol-gel. As such, Ottenstein does not teach a solid.

On the other hand, the inorganic porous material used in the present invention does not contain the organic component and is solid.

Furthermore, neither Lee nor Ottenstein teach or suggest a structure or a construction wherein the inorganic porous material with the flame retardancy-imparting component supported

thereon having a nano-scale diameter are dispersed in the resin composition as recited in amended claim 8, 13, 14 and 15.

As such, none of the cited prior art references teach or suggest all of the elements of claims 8, 13, 14 and 15. Accordingly, claims 8, 13, 14 and 15 are allowable. Furthermore, claims 9-12 depend from and further define the subject matter of claim 8 and therefore are also allowable.

Mohanty or Ohme, in combination with either Fumitomo or Gilman and further in view of Dorfman and Lee as evidenced by Ottenstein

Claims 11 and 12 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over either Mohanty or Ohme, in combination with either Fumitomo or Gilman and further in view of Dorfman (U.S. 3,983,185) and Lee as evidenced by Ottenstein. Applicants respectfully disagree with this rejection.

However, as discussed above, in an effort to expedite prosecution, claims 8, 13, 14 and 15 have been amended to recite in pertinent part, that the **inorganic porous material on which said flame retardancy-imparting component is supported has a diameter of from 25 nm to 150 nm in the resin composition.**

Furthermore, as discussed above, none of Mohanty, Ohme, Fumitomo, Gilman, Lee or Ottenstein teach or suggest such a configuration in which the **inorganic porous material on which said flame retardancy-imparting component is supported has a diameter of from 25 nm to 150 nm in the resin composition**, as recited in amended claims 8, 13, 14 and 15.

Moreover, Dorfman fails to cure the deficiencies of the previously discussed cited prior art references, at least because Dorfman also fails to teach or suggest a composition in which the

inorganic porous material on which said flame retardancy-imparting component is supported has a diameter of from 25 nm to 150 nm in the resin composition.

Thus, it is clear that none of the cited prior art references teach or suggest all of the elements of amended claims 8, 13, 14 and 15.

Accordingly, it is respectfully submitted that claims 8, 13, 14 and 15 are allowable over the cited prior art references. Furthermore, claims 11 and 12 depend from and further define the subject matter of claim 8 and therefore should also be allowed.

In view of the above amendments and remarks, Applicants respectfully submit that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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